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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LI, SHI K	

ART UNIT	PAPER NUMBER
2633	5

DATE MAILED: 06/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/847,751	TOWNSEND, VANWINKLE (VAN) T.	
	Examiner	Art Unit	
	Shi K. Li	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (W. Lin et al., "System Design and Optimization of Optically Amplified WDM-TDM Hybrid Polarization-Insensitive Fiber-Optic Michelson Interferometric Sensor", Journal of Lightwave Technologies, Vol. 18, No. 3, March 2000) in view of admission (admitted prior art).

Lin et al. discloses in FIG. 9 a telemetry system. FIG. 9 comprises a plurality of sensors arranged as a plurality of sensor arrays, a first optical splitter (1x4 DWDM DEMUX), a first transmitter consisting of four optical pulse generator, DWDM MUX and post EDFA(1) for transmitting a set of optical pulses, a optical combiner (1x4 DWDM MUX) for combining signals generated by the sensor arrays, and an optical receiver consisting of 1x4 DWDM DEMUX, four (4) OBPFs and four (4) receivers. The differences between Lin et al. and the claimed invention are (a) Lin et al. does not specify the sensors as acoustic sensors, (b) Lin et al. does not teaches a plurality of subsystems for generating digital values based on analog signals received by the sensors. Admitted prior art FIG. 1 teaches acoustic sensors 102 for telemetry application and a plurality of subsystems coupled to a subset of the acoustic sensors for receiving analog signals from the acoustic sensors and generating digital values based on the received analog signals (see page 6, lines 6-18 of instant application). One of ordinary skill in the art would have been motivated to combine the teaching of admission with the telemetry system of Lin et al. because digital signal is less likely to be corrupted by crosstalk and other non-linear

effects of fiber and, therefore, is more suitable for transmission. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a plurality of subsystems to convert analog signals from acoustic sensors to digital values for transmission, as taught by admission, in the telemetry system of Lin et al. because digital signal is less likely to be corrupted by crosstalk and other non-linear effects of fiber and, therefore, is more suitable for transmission.

Regarding claim 2, admission suggests in page 4, line 28-page 5, line 2 that the modified telemetry system of Lin et al. and admission can be used as an underwater acoustic telemetry system for a submersible vehicle.

Regarding claim 3, Lin et al. teaches in FIG. 9 that the transmitter and receiver are in the dry end and the sensor, splitter and combiner in the wet end. Admission teaches in FIG. 1 that the subsystems are positioned outboard.

Regarding claim 4, Office Notice is taken that both the concept and the advantages of passive DWDM DEMUX and passive DWDM MUX are well known and expected in the art. It would have been obvious to have used passive DWDM DEMUX and passive DWDM MUX in the modified telemetry system of Lin et al. and admission because they are inexpensive, widely available and do not require power.

Regarding claim 5, Lin et al. teaches in page 358, left col., second paragraph that the duty cycle is 1/17 for each wavelength for 8 sensors. That is the duty cycle is about 1/(2N+1). For large N, this is approximately 1/2N.

Regarding claim 6, Lin et al. teaches in page 357, right col. that the telemetry system is in a TDM format.

Regarding claim 7, Lin et al. teaches in page 357, right col. that the telemetry system is in a WDM-TDM format.

3. Claims 8-9 and 12-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. and admission as applied to claims 1-7 above, and further in view of Ishikawa et al. (U.S. Patent 5,917,637).

Lin et al. and admission have been discussed above in regard to claims 1-7. Regarding claims 8-9, 12 and 20, admission teaches converting digital values to optical pulses. However, Lin et al. and admission fail to teach modulators. It is well known in the art that a modulator is used to convert electrical signals to optical signals. For example, Ishikawa et al. teaches in FIG. 1 an electro-absorption-type (EA) optical modulator for passing and blocking optical pulses according to applied electrical signal. One of ordinary skill in the art would have been motivated to combine the teaching of Ishikawa et al. with the modified telemetry system of Lin et al. and admission because EA modulator is capable of being driven under low power and is suitable for a size reduction (see col. 1, lines 46-47). Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a EA modulator for converting digital values to optical pulses, as taught by Ishikawa et al., in the modified telemetry system of Lin et al. and admission because EA modulator is small and uses low power.

Regarding claims 13-14 and 21, admission teaches in FIG. 1 an array of acoustic sensors and suggests in page 4, lines 28-page 5, line 2 that the modified telemetry system of Lin et al. and admission can be used as an underwater acoustic telemetry system for a submersible vehicle.

Regarding claim 15, Office Notice is taken that both the concept and the advantages of passive DWDM DEMUX and passive DWDM MUX are well known and expected in the art. It

would have been obvious to have used passive DWDM DEMUX and passive DWDM MUX in the modified telemetry system of Lin et al. and admission because they are inexpensive, widely available and do not require power.

Regarding claims 16 and 22, Lin et al. teaches in page 358, left col., second paragraph that the duty cycle is 1/17 for each wavelength for 8 sensors. That is the duty cycle is about 1/(2N+1). For large N, this is approximately 1/2N.

Regarding claims 17 and 23, Lin et al. teaches in page 357, right col. that the telemetry system is in a TDM format.

Regarding claims 18 and 24, Lin et al. teaches in page 357, right col. that the telemetry system is in a WDM-TDM format.

Regarding claims 19 and 25, Ishikawa et al. teaches in FIG. 1 an electro-absorption-type (EA) optical modulator for passing and blocking optical pulses according to applied electrical signal.

4. Claims 1 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (W. Lin et al., "System Design and Optimization of Optically Amplified WDM-TDM Hybrid Polarization-Insensitive Fiber-Optic Michelson Interferometric Sensor", Journal of Lightwave Technologies, Vol. 18, No. 3, March 2000) in view of Green et al. (U.S. Patent 6,515,939 B1) and further in view of admission (admitted prior art).

Lin et al. discloses in FIG. 9 a telemetry system. FIG. 9 comprises a plurality of sensors arranged as a plurality of sensor arrays, a first optical splitter (1x4 DWDM DEMUX), four transmitters (one for each of four wavelengths), DWDM MUX and post EDFA(1) for transmitting a set of optical pulses, a optical combiner (1x4 DWDM MUX) for combining

signals generated by the sensor arrays, and an optical receiver consisting of 1x4 DWDM DEMUX, four (4) OBPFs and four (4) receivers.

The difference between Lin et al. and the claimed invention is that Lin et al. does not teach to split the individual wavelength channel into signals for each sensor in a sensor subarray. Green et al. teaches in FIG. 5 that in a TDM arrangement, pulse stream is divided into a plurality of branches by splitter 507 for each individual sensor and the responses from the sensors are combined by the same device, act as a combiner, into a single bit stream. One of ordinary skill in the art would have been motivated to combine the teaching of Green et al. with the telemetry system of Lin et al. because the approach of Green et al. allows a single pulse stream to be used for many sensors via TDM technique and reduces the number of lasers. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a splitter to split a wavelength pulse stream for each sensor, as taught by Green et al., in the telemetry system of Lin et al. because the approach of Green et al. allows a single pulse stream to be used for many sensors via TDM technique and reduces the number of lasers. Note that the modified telemetry system of Lin et al. and Green et al. has four splitters, which also act as combiners, one for each wavelength channel (or 8-sensor subarray).

Regarding claim 10, the splitters and combiners corresponding to the splitter and combiners 507 of FIG. 5 of Green et al.

Regarding claim 11, the splitters corresponding to splitter 507 of FIG. 5 of Green et al. and the combiner corresponding to the DWDM MUX at the right-hand side of FIG. 9 of Lin et al.

The modified telemetry of Lin et al. and Green et al. still fails to teach (a) acoustic sensors and (b) a plurality of subsystems for generating digital values based on analog signals received by the sensors. Admitted prior art FIG. 1 teaches acoustic sensors 102 for telemetry application and a plurality of subsystems coupled to a subset of the acoustic sensors for receiving analog signals from the acoustic sensors and generating digital values based on the received analog signals (see page 6, lines 6-18 of instant application). One of ordinary skill in the art would have been motivated to combine the teaching of admission with the modified telemetry system of Lin et al. and Green et al. because digital signal is less likely to be corrupted by crosstalk and other non-linear effects of fiber and, therefore, is more suitable for transmission. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a plurality of subsystems to convert analog signals from acoustic sensors to digital values for transmission, as taught by admission, in the modified telemetry system of Lin et al. and Green et al. because digital signal is less likely to be corrupted by crosstalk and other non-linear effects of fiber and, therefore, is more suitable for transmission.

Response to Arguments

5. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hodgson et al. (U.S. Patent 6,282,334 B1) discloses a large-scale acoustic array system using TDM-WDM technique.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 703 305-4341. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703 305-4729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

skl

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